

What is claimed:

1. A cannula for use in delivering therapeutic material, comprising:
a cannula body having a proximal end, a distal end, and a lumen extending
5 between the proximal and distal ends, wherein the distal end of the cannula body includes
a plurality of openings axially spaced from each other in fluid communication with the
lumen; and
a plunger configured to be slidably disposed within the lumen.
- 10 2. The cannula of claim 1, further comprising a detachment structure that allows the
distal end to be separated from the proximal end of the cannula body.
3. The cannula of claim 2, wherein the detachment structure comprises one or more
axially spaced notches that allows the cannula body to break into two or more pieces in the
15 presence of a shearing or twisting force.
4. The cannula of claim 3, wherein the one or more notches comprises a plurality of
notches.
- 20 5. The cannula of claim 3, wherein the one or more notches are circumferentially
offset from each other.

6. The cannula of claim 2, wherein the detachment structure comprises a mechanical junction that allows the cannula body to separate into two pieces in the presence of an external force.

5 7. The cannula of claim 6, wherein the mechanical junction comprises a connective sleeve that allows the cannula body to separate into two pieces in the presence of the external force.

8. The cannula of claim 6, wherein the mechanical junction comprises a threaded
10 junction that allows the cannula body to separate into two pieces in the presence of a rotational force.

9. The cannula of claim 1, wherein the plunger further comprises a pliable sealing member.

15 10. The cannula of claim 1, wherein the cannula body comprises a biocompatible material.

11. The cannula of claim 1, wherein the plunger comprises a biocompatible material.

20 12. The cannula of claim 1, wherein the plurality of openings comprises a longitudinal opening at a distal tip of the cannula body, and a transverse opening proximal to the distal tip of the cannula body.

13. The cannula of claim 1, wherein the plurality of openings further comprises a plurality of axially spaced transverse openings proximal to the distal tip of the cannula body.

5 14. The cannula of claim 13, wherein the plurality of transverse openings are circumferentially offset from each other.

15. The cannula of claim 13, wherein the plurality of transverse openings is arranged into axially spaced groups.

10 16. The cannula of claim 15, wherein each transverse opening group comprises a plurality of axially aligned openings.

17. A method for delivering implant material into tissue using a cannula comprising a
15 cannula body having a first opening and a second opening proximal to the first opening, and a plunger slidably disposed within a lumen of the cannula body, the method comprising:

inserting the cannula body into a distal section of a tissue;

perfusing the implant material out of the first opening into the tissue;

proximally displacing the plunger from a first position distal to the first opening

20 into a second position between the first and second openings; and

perfusing the implant material out of the second opening into the tissue while the plunger is in the second position.

18. The method of claim 17, further comprising severing a distal portion from a proximal portion of the cannula member.

19. The method of claim 17, further comprising separating a distal portion from a proximal portion of the cannula member.

20. The method of claim 17, wherein the implant material is longitudinally perfused out of the cannula body through the first opening, and transversely perfused out of the cannula body through the second opening.

21. The method of claim 17, wherein the cannula body further comprises a third opening proximal to the second opening, the method further comprising:

proximally displacing the plunger into a third position between the second and third openings; and

perfusing the implant material out of the third opening into the tissue while the plunger is in the third position.

22. The method of claim 12, wherein the implantable material is bone cement.

23. The method of claim 17, wherein the tissue is bone tissue.

24. The method of claim 23, wherein the bone tissue is a vertebral body.

25. A cannula for use in delivering therapeutic material, comprising:
a cannula body having a proximal end, a distal end, a lumen extending between
the proximal and distal end, and a detachment structure that allows the distal end to be
separated from the proximal end.

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26. The cannula of claim 25, wherein the detachment structure comprises one or more
axially spaced notches that allows the cannula body to detach into two or more pieces in the
presence of a shearing or twisting force.

10 27. The cannula of claim 26, wherein the one or more notches comprises a plurality
of notches.

28. The cannula of claim 26, wherein the one or more notches are circumferentially
offset from each other.

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29. The cannula of claim 25, wherein the detachment structure comprises a
mechanical junction that allows the cannula body to separate into two pieces in the presence of
an external force.

20 30. The cannula of claim 29, wherein the mechanical junction comprises a connective
sleeve that allows the cannula body to separate into two pieces in the presence of the external
force.

31. The cannula of claim 29, wherein the mechanical junction comprises a threaded junction that allows the cannula body to separate into two pieces in the presence of a rotational force.

5 32. The cannula of claim 25, wherein the cannula body comprises a bioabsorbable material.

33. The cannula of claim 25, wherein the cannula body further comprises a plurality of openings axially spaced from each other in fluid communication with the lumen.

10 34. The cannula of claim 33, wherein the opening comprises a longitudinal opening at a distal tip of the cannula body and the plurality of openings comprise at least one transverse opening proximal to the distal tip of the cannula body.

15 35. The cannula of claim 34, wherein the plurality of transverse openings are circumferentially offset from each other.

36. The cannula of claim 34, wherein the plurality of transverse openings is arranged into axially spaced groups.

20 37. The cannula of claim 34, wherein each transverse opening group comprises a plurality of axially aligned openings.

38. A method for delivering implant material into tissue using a cannula comprising a cannula body having a proximal end, a distal end, one or more openings, the method comprising:

inserting the cannula body into tissue;

perfusing the implant material out of the one or more openings into the tissue; and

separating the proximal end from the distal end of the cannula body.

39. The method of claim 38, wherein the implantable material is bone cement.

40. The method of claim 38, wherein the tissue is bone tissue.

41. The method of claim 40, wherein the bone tissue is a vertebral body.

42. The method of claim 38, wherein the one or more openings comprises a plurality of openings axially spaced from each other the method further comprising

perfusing the implant material out of the plurality of openings into the tissue.

43. The method of claim 38, wherein the cannula further comprises a plunger configured to be slidably disposed in a lumen of the cannula body, and the one or more openings comprises a first opening and a second opening proximal to the first opening, the method further comprising:

proximally displacing the plunger from a first position distal to the first opening into a second position between the first and second openings; and

perfusing the implant material out of the second opening into the tissue while the plunger is in the second position.

44. The method of claim 38, wherein separating the proximal end from the distal end
5 of the cannula body comprises detaching the cannula body by applying a shearing or twisting force.

45. The method of claim 38, wherein separating the proximal end from the distal end
of the cannula body comprises unscrewing the proximal end from the distal end.

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46. The method of claim 38, further comprising implanting the distal end of the
cannula body within the tissue.

47. The method of claim 46, wherein the distal end of the cannula body is composed
15 of a biocompatible material.